A comparison between different oxalic acid treatments in overwintering Apis mellifera colonies affected by Varroa destructor

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The effects against the ectoparasite *Varroa destructor* of winter treatments with oxalic acid (OA) administered to broodless colonies were compared in two apiaries located in continental and in Mediterranean locations. Each of the apiaries sized fifty colonies and was split into five homogeneous groups that were treated as follows:

- Five ml per comb of OA/sucrose (S) solutions at the % concentrations 4.2/60, 3.2/60 and 4.4/30 trickled into the colonies of groups A-C, respectively;
- 1.4g of OA sublimated in the colonies of group D, with a heating device;
- the group E served as a negative control..

A control treatment allowed to recover the surviving mites and to calculate the efficacy.
Quantitative evaluations of the number of adult honey bees and of the brood cells helped to assess the tolerability.

In the respective apiaries, the pre-treatment colony size averaged 8840 and 10530 adults. At the end of the winter, it had decreased of 20-35% and 8-27%, whereas the brood area sized 1 454 and 10 391 cells, respectively. The ANOVA showed a significant effect of the location on the above parameters, whereas the effect of the treatment was non-significant.
Therefore no evidence for insufficient tolerability of some of the treatments could be attained and a worse situation in the treated colonies vs untreated controls neither.

The low infestation prevented the possibility to draw conclusions about the treatment efficacy in the Mediterranean apiary. In the colder location, the mite mortality averaged 87.7, 87.1, 70.3, 91.0 and 13.6% in the groups A-E respectively. Those values were somewhat lower than the expected ones; this might be related to unfavourable levels of the relative humidity in the first week of treatment.
The significantly lower mite mortality in group C stresses the need of a sufficiently high sugar concentration in the solutions intended for trickling. No significant differences occurred between the other groups, whose respective treatments seemed alternative on the practical point of view.

Moreover, the data show that the detection of the natural mite mortality as a diagnostic method for the quantitative varroa infestation might be poorly reliable (Squared R=0,501). Similarly, the actual number of adult bees in a winter colony is largely independent on number of combs on which they actually spread (Squared R=0.507), although the consequent errors in the estimation do not necessarily imply an influence on the treatment performances.